Space Weather Forecast

Issued on Tuesday, 21 February 2023 at 01:12 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Moderate class flares (R1-R2; Minor-Moderate radio blackouts) throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate in the past 24 hours, with frequent mid-level Common-class flares recorded, and one Moderate-class flare at 20/1458UTC from a new emerging region in the far northeast. The second largest of the aforementioned flares was observed at 20/0702UTC from near the leading spot of a group in the northwest, with the spot group itself otherwise showing visual fading. Nine active regions cover the visible solar disc. Of the current sunspot groups, the largest and nominally most potent sunspot group remains in the northeastern quarter of the disc, and it's this particular region that was responsible for the CME shock arrival on the 20 February arising from the Strong-class flare of 17 February.
A 'prominence eruption' was observed from the southwest during the UTC afternoon of Sunday 19 February, erupting from near a sunspot in this location, and this has a small chance of delivering a glancing interaction late on day 2 or early day 3 (Wednesday 22 or Thursday 23 February). No further significant CME events are earth-bound.

Solar Wind / Geomagnetic Activity: Solar winds were mostly Slow to start before giving way to the arrival of the awaited shock from the 17 February Strong-class associated CME, which reached Earth-based magnetometers at 20/1045UTC, with slightly elevated levels being attained thereafter. The number of particles in the solar wind was also mostly in its normal Background range, before becoming mostly above average after the CME shock arrival. The magnetic field associated with these particles was Weak to start then becoming generally Moderate after the CME shock passed. The all-important north-south component followed a similar pattern but mostly remained within the confines of Weak levels. The net result of the above solar wind measures was for quiet geomagnetic activity.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low activity is expected, with a chance for further Moderate-class X-ray flares and a slight chance of becoming High from any isolated Strong-class flares - the main risk being from the sunspot that has produced them in the recent past in the northeastern quarter of the Sun.

Solar Wind / Geomagnetic Activity: Solar winds are slightly elevated following the muted shock from the 17 February CME. A decline is likely back to Slow levels during Day 1 (Tuesday 21 February). There is a very low chance of a further CME glance (from 19 February) later day 2 or day 3 (Wednesday 22 or Thursday 23 February), but this is currently not expected. In terms of recurrent fast solar wind sources (from persistent 'coronal holes'), a slight enhancement may arise by day 2 (Wednesday 22 February). Geomagnetic activity mostly at Quiet levels, perhaps

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becoming Unsettled to Active as the 'coronal hole'-sourced fast wind arrives by day 2 (Wednesday 22 February), combined with any arrival of the minor glance from the 19 February CME, which could give a minor geomagnetic storm interval.

Energetic Particles / Solar Radiation: Solar radiation levels are most likely to remain at background levels, but with a slight chance of rising towards the S1 level, perhaps exceeding it should any larger X-ray flares occur.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	20	10	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	40	30
Very Active	R3 to R5 X	No	10	10	10	10

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Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	10	10	10	10
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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